X-22A PROGRESS REPORT NO. 25

DECEMBER 1964

TRI-SERVICE

V/STOL

RESEARCH AIRCRAFT

REPORT NO. 2127-933025
15 JANUARY 1965

NAVY CONTRACT NO. NOw 63-0118-c

BELL AEROSYSTEMS COMPANY
DIVISION OF BELL AEROSPACE CORPORATION—A TEXTRON COMPANY
Buffalo

BELL AEROSYSTEMS COMPANY

X-22A TRI-SERVICE V/STOL AIRCRAFT

MONTHLY PROGRESS REPORT

Report No. 2127-933025

December 1964

This is the twenty-fifth Monthly Progress Report as required in Section F(5) of the contract, and outlines progress for the period 1 December 1964 through 31 December 1964. For an illustration and a brief introduction of the X-22A program refer to reports prior to May 1964.

A. J. Marchese
Project Director
X-22A PROGRAM

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I. SUMMARY

On the 8th and 9th of December, approximately 40 military personnel from all 3 services and other interested government agencies visited Bell for a complete X-22A Technical Status and Planning Review (see Figures 1 and 2). Follow-up and coordination is continuing to realize the utmost from the discussions.

Efforts to conclude the planning and finalize arrangements for the Bell conducted tests of the ESCAPAC 1D Seat System from the X-22A Cockpit were expedited. ACEL Hi-Speed cameras and photographers are now included in the test plans. Tentative plans are to accomplish these tests in mid January.

Engineering efforts continued in the liaison and drawing change support of manufacturing and assembly operations. Support also continued to the Propulsion System and Control System Test programs, including preparation of test plans and reports. Work by the Engineering Laboratory on the fabrication and assembly of the Static Test fixture for the aircraft is progressing to schedule.

The weight this month remained at 497.0 pounds over target.

The 1/3 scale Powered Duct Model Static Tests and the Powered Free Flight Model force and free flight transition tests are the remaining Wind Tunnel programs. Both these models are now scheduled for test in January.

The Propulsion System Test Stand operated 6.3 hours during the period making the total development time 24.4 hours. Early in the month, installations of the reworked shafts, couplings, viscous mounts, and Beta control were completed. The stand was also stiffened to eliminate stand vibration at high engine speeds. Phase II variable pitch operation was initiated. Using the Master Control and Beta System, the propeller speed control was checked satisfactorily.

In test, No. 4 bearing hanger lost grease and overheated, damaging the coupling. Also, during test, No. 1 propeller was damaged. Investigation revealed that the assembly had to be returned to Hamilton Standard and a replacement is being expedited for early January installation.

Figure 1. Technical Status and Planning Review

Figure 2. Technical Status and Planning Review

-The Flight Control-Hydraulic System Test Stand was completed and checked, less the duct rotation system installation. The Feel System overdrive and Elevon instability were investigated. The Test Stand was used, excluding these trouble areas, to perform development testing.

The long series of cumulative problems related to the delays of the Duct Support now will be integrated into firm schedules evidenced by the completion of the first -136 Splined Tube. After cleanup, plating, and painting, the first unit is to be delivered to Bell early in January. The future deliveries, as scheduled, can now be assessed. However, due to slow progress and a pending strike situation, a backup splining contractor is being sought.

The test Support Tube -014 units have been supplied to United Shoe Machine Co. for the checkout and acceptance tests of the Harmonic Drives to start in January. With the tubes and harmonic drives, the Duct Rotation system will be able to progress. The program planning has been revised to reflect the availability of these components as evidenced on the program schedule of 31 December 1964 (see Figure 3).

In the shop, aircraft No. 1 progressed with Wing and Fin permanent installations. Systems fabrication and installation moved satisfactorily. Fuselage No. 2 was removed from the basic fixture into aircraft No. 2 final assembly. After cleanup, systems installations were started. Fuselage No. 3 for static test was begun. Major components for aircraft No. 1 are essentially completed. Components for No. 2 are in final phases and No. 3 for static test are progressing.

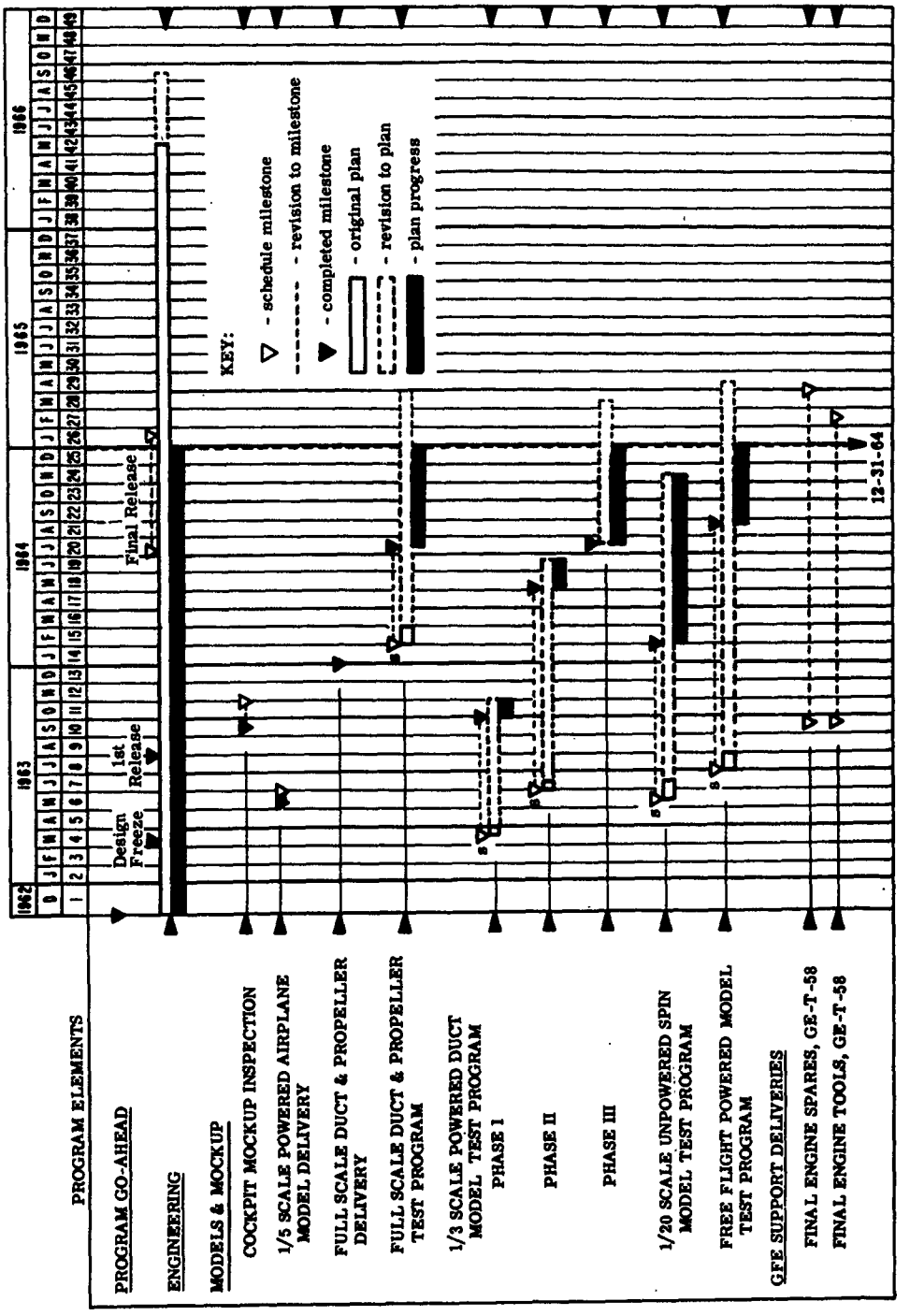


Figure 3. X-22A Program Schedule (Sheet 1 of 4)

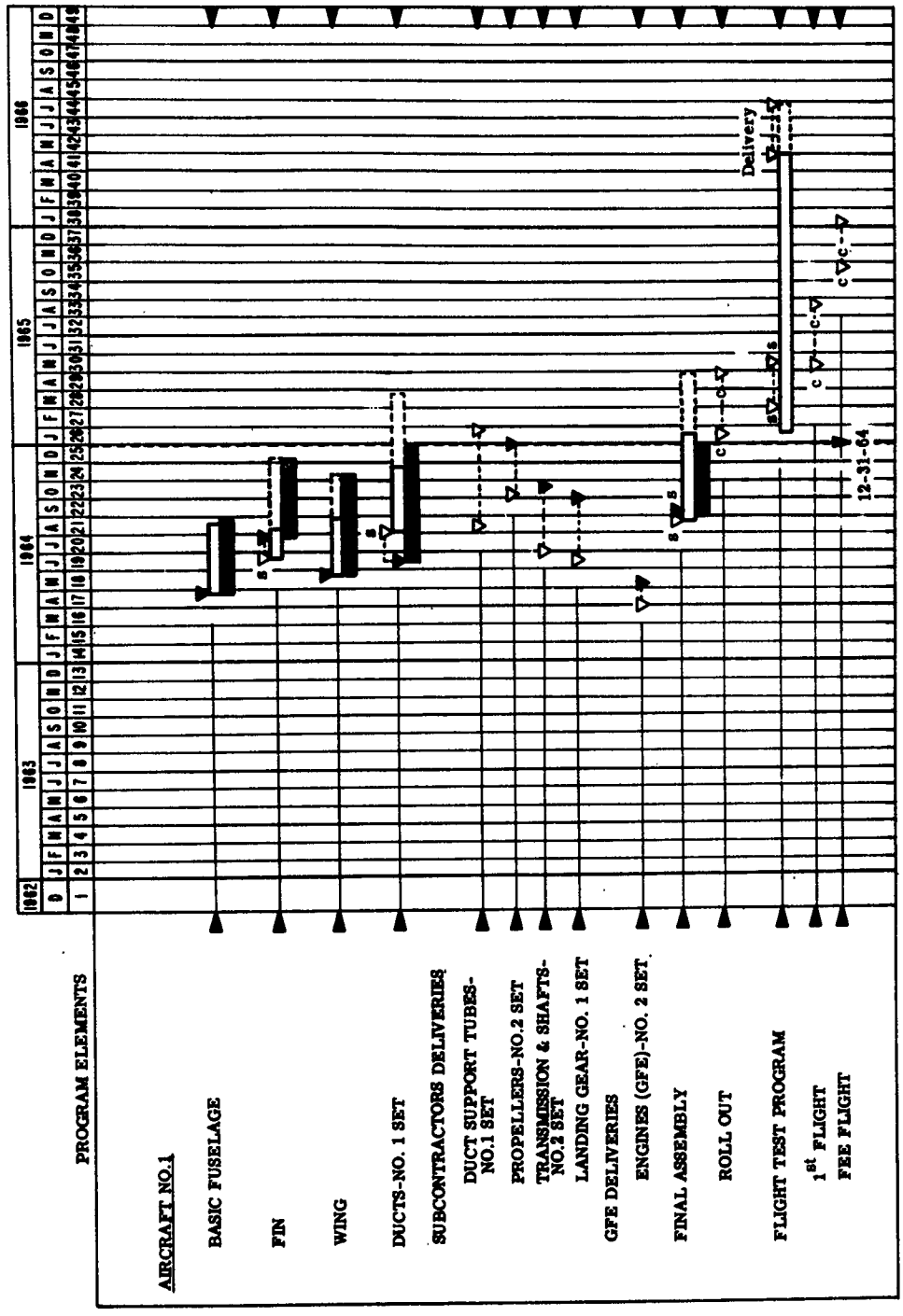


Figure 3. X-22A Program Schedule (Sheet 2 of 4)

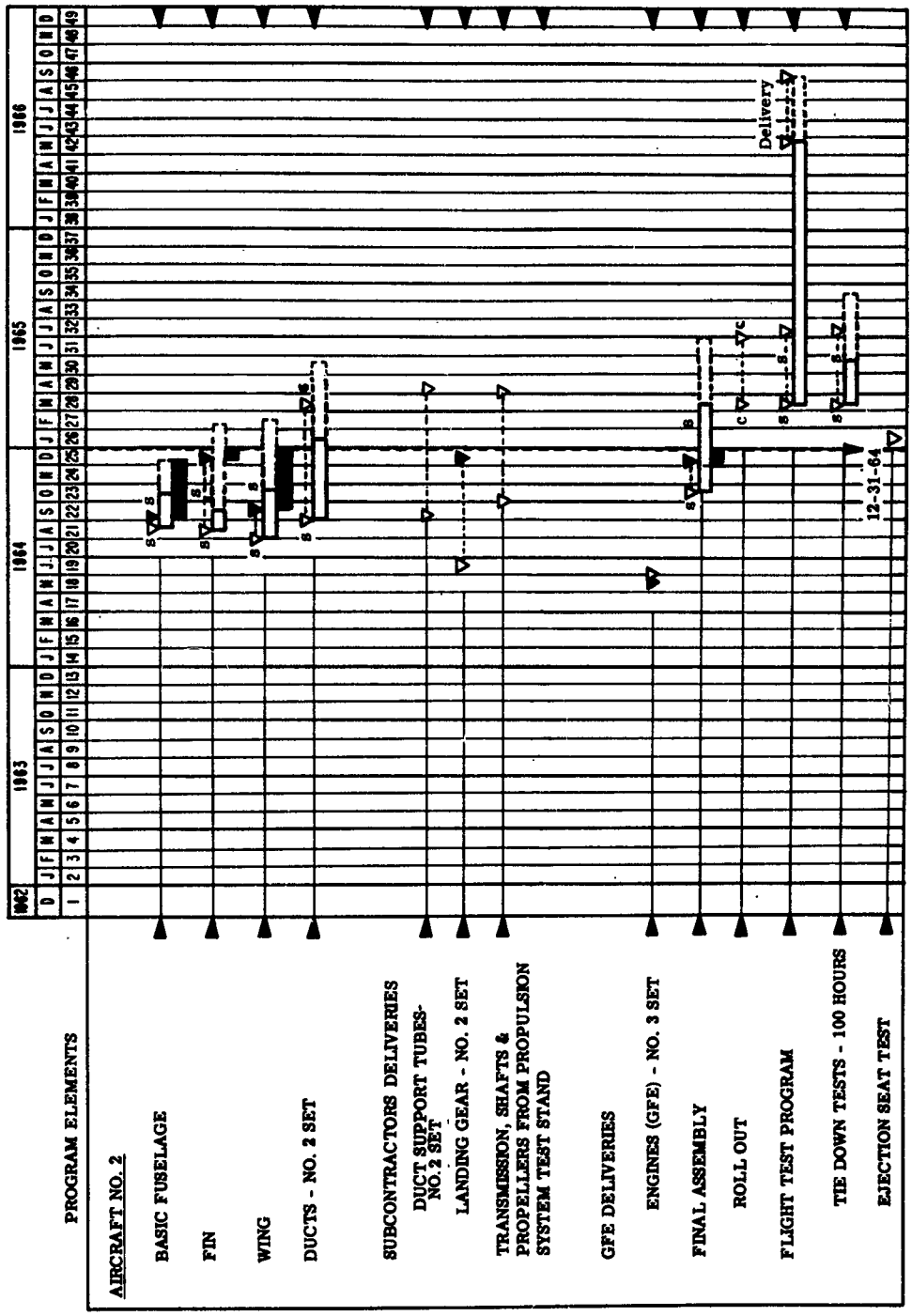


Figure 3. X-22A Program Schedule (Sheet 3 of 4)

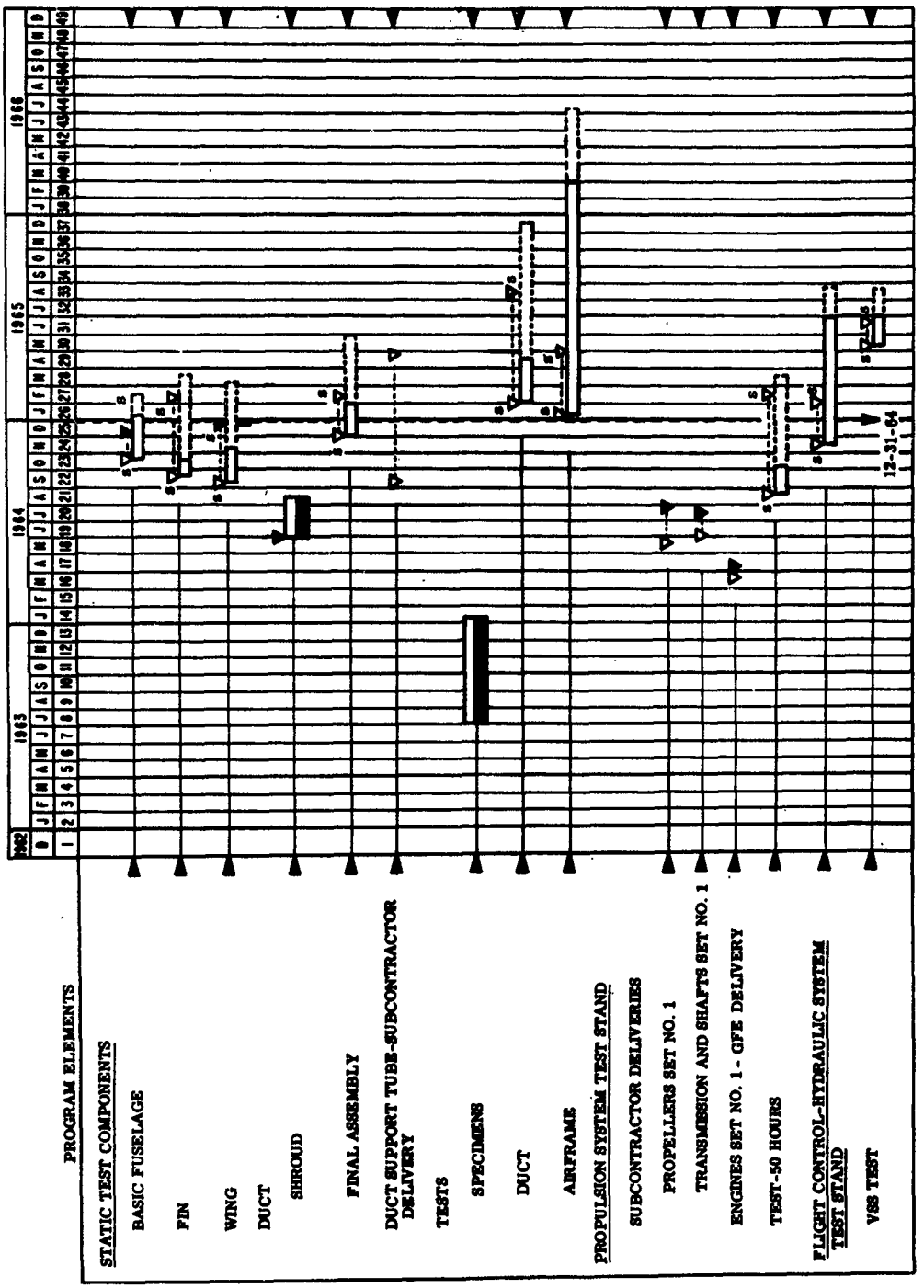


Figure 3. X-22A Program Schedule (Sheet 4 of 4)

II. DESIGN

A. FLIGHT TECHNOLOGY

1. Performance

A new Characteristic Summary was issued based on present estimates of drag and propulsion efficiency. The maximum endurance and maximum speed are 1.24 hours and 288 knots as reported in the November progress report.

2. Stability and Control

The December 1964 revision to the Stability and Control Report was completed and submitted to BuWeps.

Additional wind tunnel tests were made on the Full-Scale Powered Duct Model at NASA-Ames during which hinge moment data were obtained. These data are being analyzed.

The three degree-of-freedom longitudinal simulation studies have been completed and the six degrees-of-freedom studies are currently in progress to evaluate control feel forces and gradients. Following this, evaluations are to be made of collective stick control throughout transition and general handling qualities.

3. Propulsion Analysis

Available NASA-Ames Full Scale Duct Model test data are being analyzed for updating performance, stall boundary and effect of the "V" strut. Blade stress measurements indicate no dangerous alternating loads. The installation of the slip ring "V" struts did not cause any observable flow separation or significant blade stress increases.

B. VEHICLE STRUCTURES

1. Criteria and Loads

Component air loads and gross internal loads for selected locations on the airframe have been determined for the critical horizontal gust and rudder kick conditions. The rudder kick loads have been found to be somewhat more critical than the gust loads for the vertical fin, ducts, and aft fuselage. The high speed rudder kick maneuver is being reexamined based upon duct incidence angles which are restricted to $\lambda_{D_F} = 2°$ and $\lambda_{D_A} = -3°$.

2. Structural Analysis

a. Airframe

The forward and aft fuselage bearing hangers were redesigned to accommodate the Sikorsky viscous damper bearings. Fuselage frames at stations 260 and 266.66 were revised to provide necessary stiffness for dynamics. Lateral stability of these frames was increased significantly by using back to back channels.

b. Flight Control System

Work is nearing completion on the Flight Control System Loads Report. The lower fitting of the attitude stick is being rechecked to see if material can be removed to obtain higher stress loads for strain gage readings.

3. Structural Tests

The fuselage test plan report is in final typing. Work is continuing of test plans for the landing gear installations and the aft duct assembly.

Design of the wing loading fixtures and devices was completed. Design of the duct loading fixtures and devices is continuing. Fabrication in the Engineering Laboratory of the duct support pivot and the aft basic test fixture was completed. (See Figure 4). Subsequent work on the basic fixtures will adapt them for use during specific tests.

4. Aeroelasticity

Control system loops are being added to flutter analyses to check servo flutter characteristics.

5. Weights

The current weight empty remains at 11072.3 pounds which is 497 pounds over the tentative target weight empty of 10575.3 pounds. 23.5 pounds is included in the current weight empty for changes required during final assembly and other such contingency items.

The center of gravity location remains satisfactory. Preparation of weight and balance status report number 12 has been initiated.

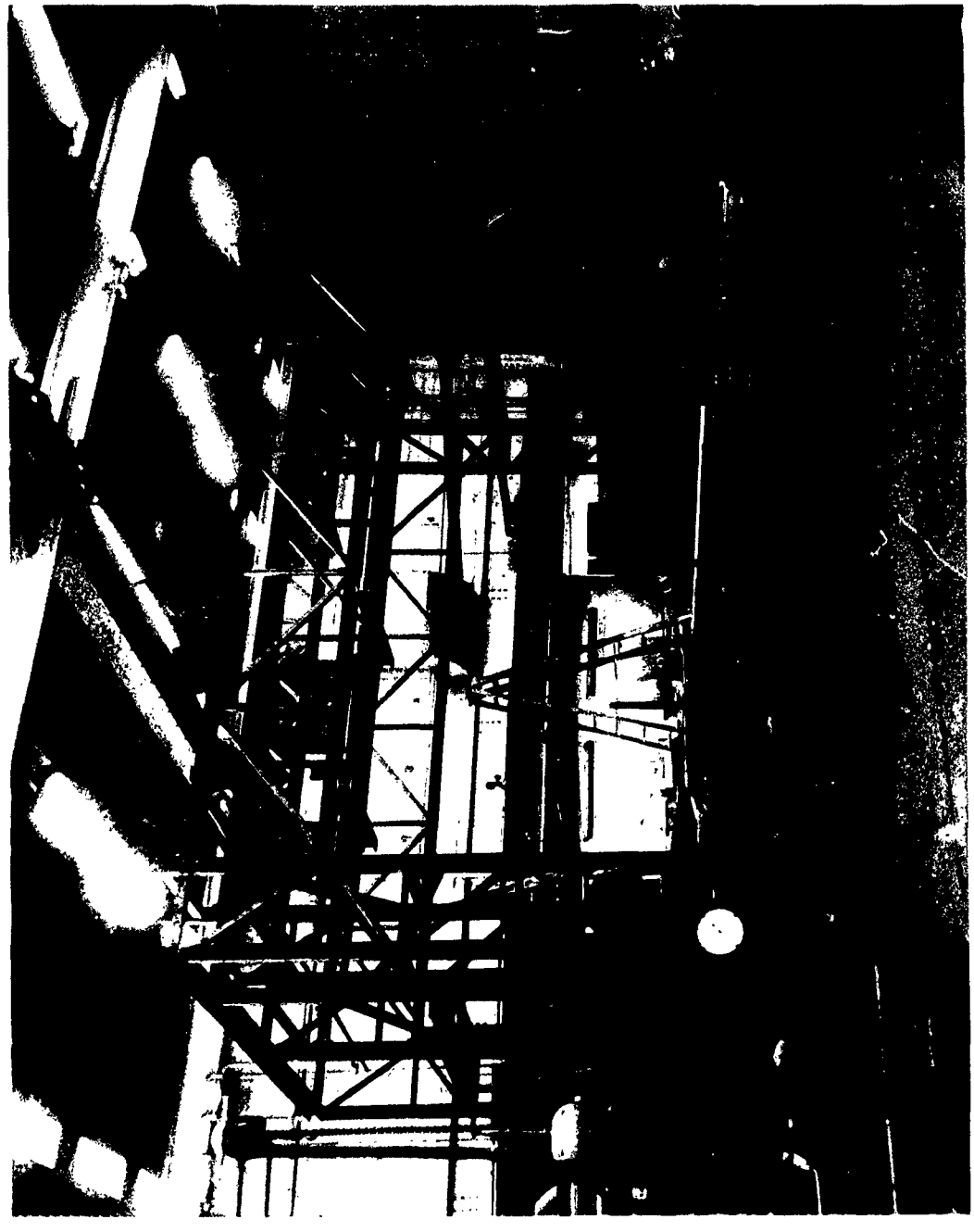


Figure 4. Basic Static Test Fixture

C. DESIGN

1. General

Manufacturing liaison and propulsion system test stand and control system and hydraulic test stand coordination are the major items of work in the design area.

2. Airframe

The major efforts in airframe design are drawing changes and liaison with manufacturing. Stiffening of the fuselage frames holding the longitudinal shaft bearing supports was incorporated to provide the necessary dynamic characteristics.

3. Flight Controls and Equipment

a. Flight Controls

Design of intercostals to stiffen the frames supporting central bearing hangers were completed.

Recommended changes for the Feel and Trim system are being prepared for review. The closed loop instability problem on the Feel system has been corrected and checked on the control system test stand. Work is continuing on the test stand detail test plan and procedures.

b. Equipment and Ground Equipment

Coordination with flight test is being maintained in preparation for ejection seat tests. The inboard profile drawing was up-dated to show required additional information.

4. Propulsion Design

a. Propulsion Design (Aircraft)

The specification control drawing for longitudinal shaft viscous damped mounts was completed and forwarded to Sikorsky. General installation design for the viscous mounts was started and is now in progress.

b. Propulsion Liaison

Normal shop liaison support is continuing.

c. Test Stand Design Activity

The design work for the beta drive system was completed. Work is nearing completion on design of the shaft coupling cooling tubes for the test stand.

d. Test Procedures

The Phase II development test procedures have been drafted and are now being prepared for general issue. The 50-hour qualification test procedures are in draft form. Minor revisions to the plan will be made to conform to the current stand operating requirements. The electrical loading network is nearing completion.

5. Landing Gear and Hydraulics

a. General

Engineering effort is continuing in the areas of manufacturing support during assembly and installation and also in the checkout of components and subsystems on the Control System Test Stand.

b. Landing Gear

Brake tests have been completed at Goodyear and new brake assemblies are to be available on 12 January.

Main wheel roll tests are still in progress at Goodyear and 300 miles of the required 500 mile rolling distance testing at a maximum gross weight of 8600 pounds have been completed.

Drop tests have been completed on both the main and nose gear struts and the test results are being reviewed by engineering.

Two complete ship sets of landing gear have been delivered to Bell.

c. Hydraulic System

The throttle boost actuator component design approval test has been completed and the report has been approved. The stability augmentation system actuator test has been completed and the report is being reviewed. The elevon actuation system, the VSS positioning actuator, and the pitch boost actuator tests are in progress.

The VSS feel actuator initial tests have been completed and the vendor is investigating the high by-pass forces. The motor speed control valve test results indicate that additional strength is required in the mounting lugs. All parts are to be reworked by the vendor.

Two sets of stability augmentation system and variable stability system feel actuators have been reworked to replace the filters in the servo valves. The third set is presently at the vendors for rework.

The boost actuators from the control system test stand have been returned to the vendor for rework and retest to bring the loop gain up to acceptable limits.

D. SYSTEMS SUPPORT

1. Human Factors

Pilot-simulator perfo[illegible]ce data were plotted as preliminary learning criteria. Simulator program support continued in aircraft handling qualities evaluation in both longitudinal and six-degree-of-freedom studies. Possible hard-over stick failures were considered from the standpoint of clearances in ejection escape.

2. Maintainability and Aerospace Ground Equipment

The Inspection Requirements Manual has been revised and is being reviewed. New access doors have been added to the access panel listing.

Aerospace ground equipment for the transmission system installation has been reviewed. Of the requirement, two pieces will be redesigned and one piece is yet to be designed.

E. SYSTEMS ANALYSIS AND SIMULATION

A modification to the feel system which will limit the actuator force on the stops at the end of the stick travel has been tested. The results were satisfactory with respect to limiting the load but indicate some changes to the electronics will be required.

The control system test stand data handling programming is 90% complete. The flight test data handling effort concentrated on the processing required for the instrument calibration coefficients.

Liaison support of the fabrication and testing of the variable stability system, artificial feel and trim system and the stability augmentation system continued. (See Figures 5, 6, 7, 8, and 9.)

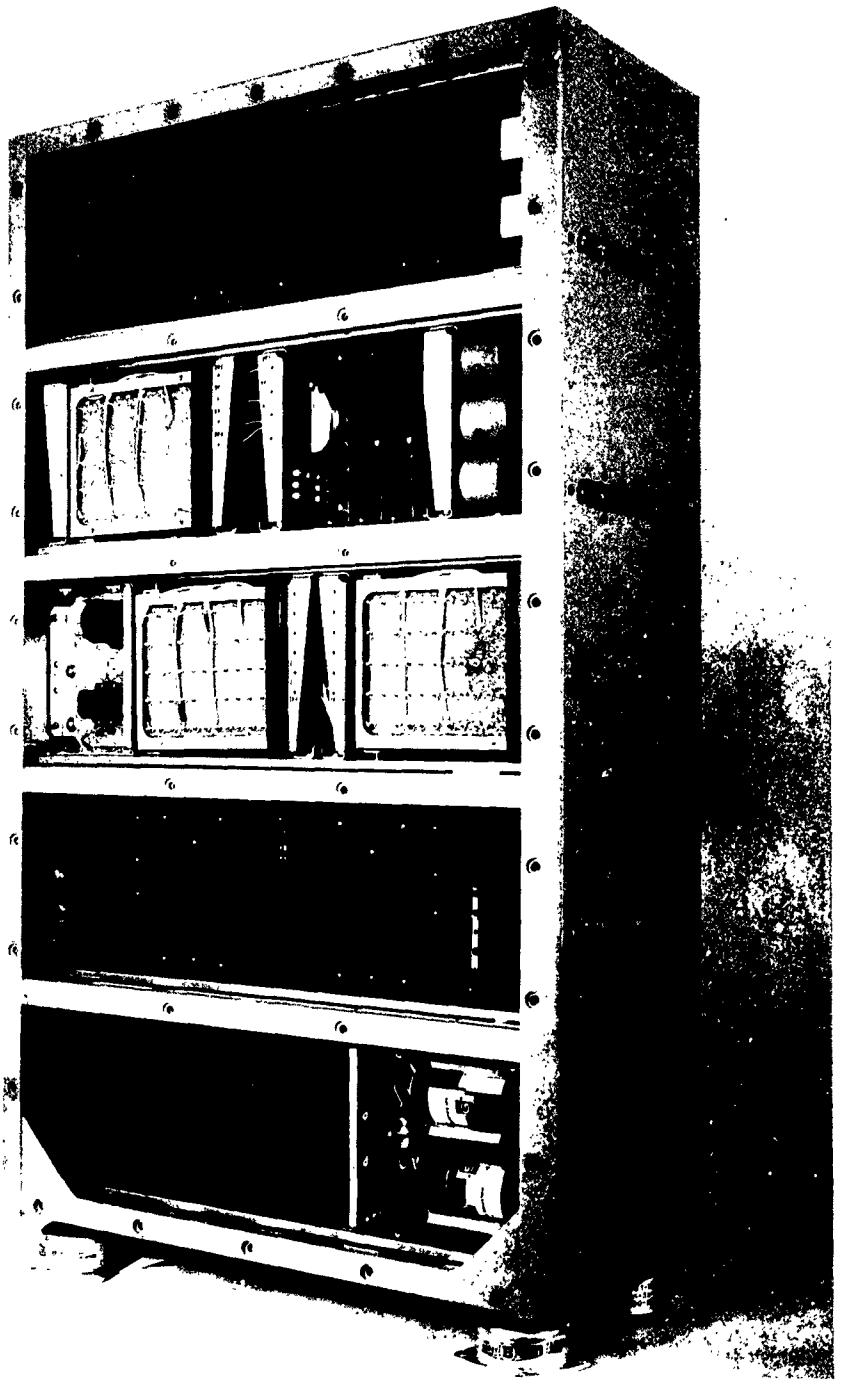


Figure 5. Stability Augmentation System and Feel and Trim System Complete Assembly

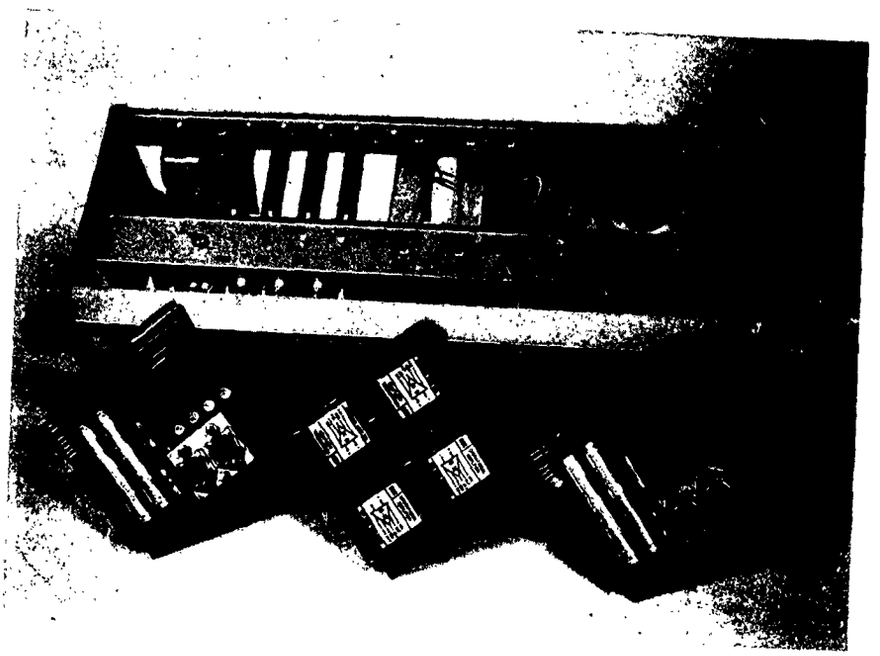


Figure 6. SAS Power Supply and Redundant Servo Drawer With Typical Circuit Cards

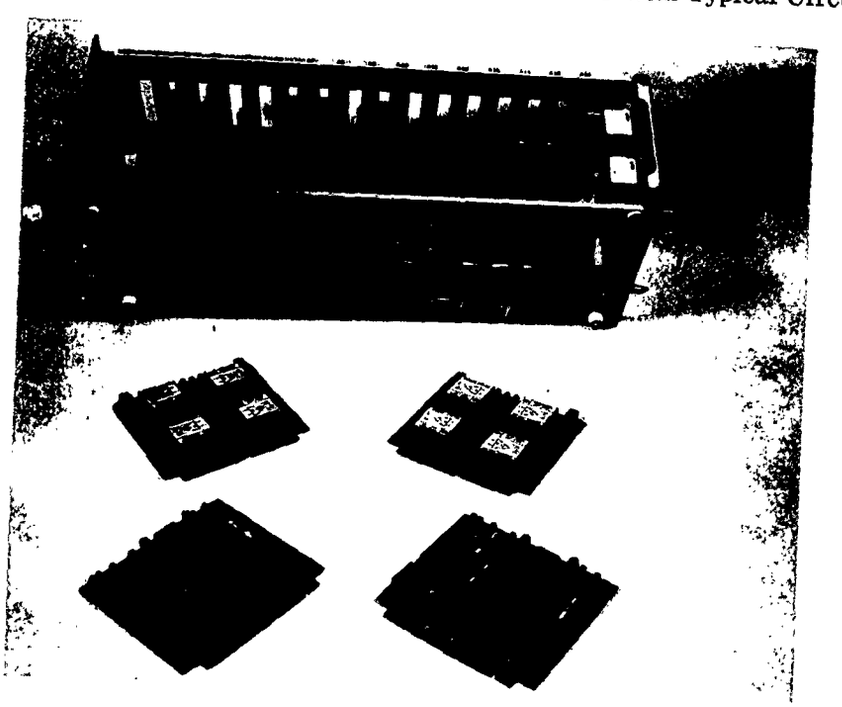


Figure 7. SAS Drawer With Circuit Cards Removed

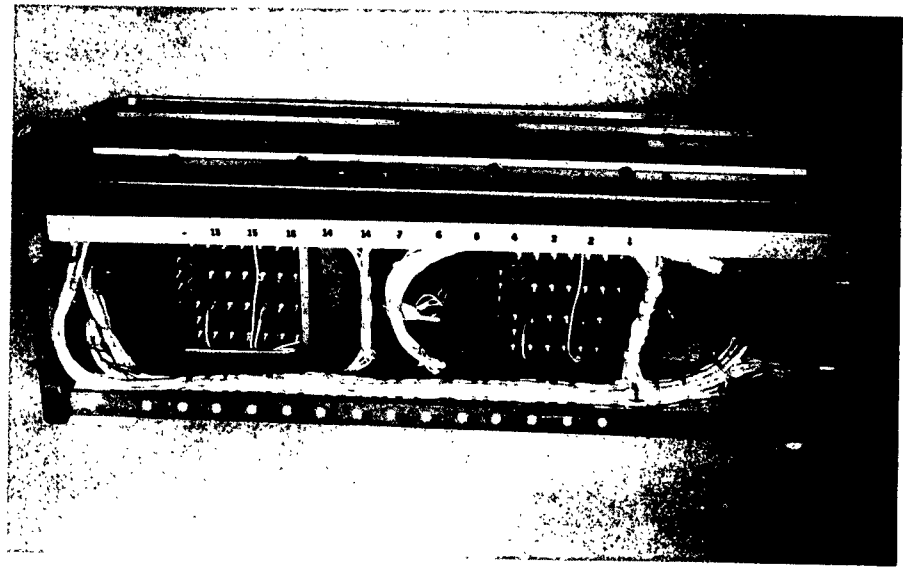


Figure 8. Feel and Trim System Servo Drawer

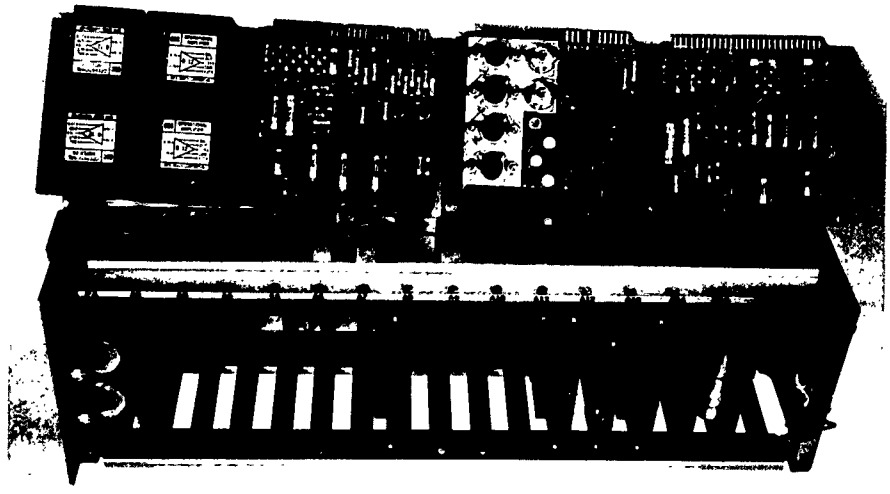


Figure 9. Feel and Trim Longitudinal and Lateral Drawer With Circuit Cards Removed

III. MODELS

A. WIND TUNNEL TEST PROGRAMS

1. 1/3-Scale Powered Duct Model

Static tests of this model are being conducted by David Taylor Model Basin. Completion is now expected in January.

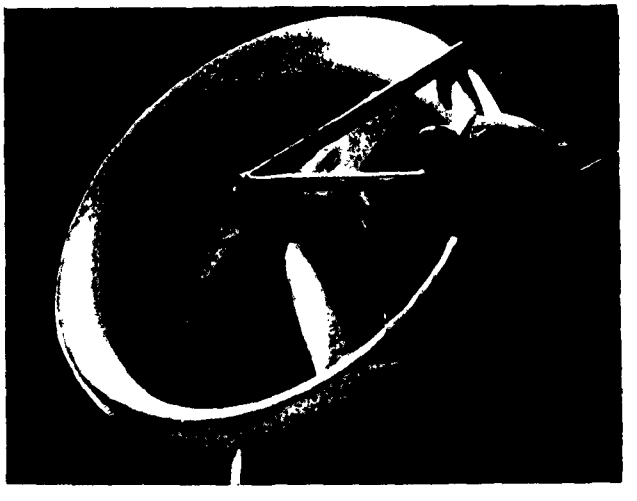
2. Full-Scale Powered Duct Model (See Figure 10)

A test program incorporating various duct modifications and blade angles was completed 21 December. Test data are being analyzed.

3. Powered Free Flight Model (0.18 Scale)

Resumption of test of this NASA model to include force and Free Flight Transition Tests has been rescheduled by NASA to January 1965.

Full-Scale Powered Duct Model NASA-Ames Installation



Duct Model Showing Blade Stress Pineapple "V" Strut Installation

Duct Model Showing Faired Strut Fillets

Figure 10. Full Scale Powered Duct Model

IV. TEST STANDS

A. PROPULSION SYSTEM TEST STAND

The test stand was operated for 6.3 hours during the month of December, for a total of 24.4 hours of development testing as of 31 December 1964. Of this total time, 19.3 hours were obtained with a fixed propeller pitch and 5.1 hours were accumulated using the Master Control and Beta System to vary propeller pitch and maintain a preset propeller speed.

During the test runs, using the Master Control and Beta System, propeller speed control was checked at various settings from 1900 to 2600 rpm up to maximum operating limits of the test stand. Approximately 5000 horsepower was obtained when operating at 2600 rpm. Speed control was satisfactory during these tests.

The period from 1 December 1964 through 15 December 1964, was spent completing installation and checkout of the reworked drive shafts, couplings, viscous bearing mounts, master control and associated input controls for the Beta System from the test stand to the control room. The test stand was also operated for 1.2 hours with fixed propeller pitch during this period to checkout the reworked drive shaft system, and new viscous damped bearing mounts.

Phase II development testing for variable pitch operation was initiated 16 December 1964 and 5.1 hours of operation were accumulated. On 19 December 1964, an inspection performed after a maximum horsepower run, revealed that the forward right lateral shaft coupling adjacent to No. 4 bearing hanger had lost grease and overheated. Disassembly and inspection showed that the disc shaped "O" ring grease retainer was fractured, the nylon bumper was melted and charred, one tooth on the spherical coupling was broken and all coupling parts were discolored by the heat.

Measurements of the lateral shaft angular offsets were made at all bearing hanger locations. It was confirmed that the offsets were the required 1°.

The failure of the "O" ring grease retainer was attributed to dimensional interference between the O.D. of the retainer and the I.D. of the curvic coupling when the coupling was subjected to high torque. The O.D. of the retainer was reduced and new shaft assemblies are presently being installed.

During a test run, an instrumentation bracket broke loose from the test stand and struck No. 1 propeller. All three blades incurred damage. The damage was more

extensive than preliminary examination indicated and the propeller must be returned to Hamilton Standard for repair. The propeller will be replaced with the next L.H. prop received at Bell and the repaired prop will be reinstalled on the test stand prior to qualification testing.

Test stand stiffness was increased at the rear support of each engine to eliminate a stand resonance at about 300 cps which caused excessive engine motion at top operating speeds. Stand operation subsequent to the stiffening showed that this high speed vibration had been effectively cured. Additional stiffening of the stand at the forward engine supports has recently been completed to cure a resonance at a natural frequency of 37 cps (2220 prop rpm). Stand operation early in January will check the effectiveness of this rework.

B. FLIGHT CONTROL - HYDRAULIC SYSTEM TEST STAND

Final rigging and adjustments have been completed on both the elevon and propeller pitch control systems. During checkout of these systems, an elevon instability and a feel system overdrive condition were disclosed.

The feel system overdrive condition produced excessive loads on the stick when the stick was moved against its mechanical stop. This condition was eliminated by relocating the strain gage sensors on the stick.

The elevon instability manifests itself as an oscillation of the simulated elevon surfaces at a frequency of approximately 26 to 30 cps. This condition can be excited by sudden stick motion or sudden load application on the elevon surface. Vibration characteristics are being measured on the stand and on the control system to determine the cause of the instability. Lateral stiffening of the test stand is in progress to remove any external influence which the stand may have on the stability of the system. After the elevon condition has been corrected, hydraulic system testing will be initiated. Installation of the duct will be accomplished after receipt of two support tubes. The last of these parts are expected in February.

V. MANUFACTURING (See Figures 11, 12, 13, 14, and 15)

Efforts were concentrated in the assembly of components and the fabrication and the incorporation of required changes. Major components and systems installations in aircraft No. 1 and 2 progressed.

At the close of December the first Splined -136 Duct Support tube was inspected by Bell Quality at the vendors facility. It will be plated and painted prior to delivery and installation (See Figure 16). The pacing and critical production problem appears resolved. The program will now be geared to the phasing back into fixture of the Duct Shrouds for Duct Assembly completion.

Currently six ducts (including one for Static Test) are completed and stored waiting for -136 duct support tubes. Two are in work in the assembly fixtures. The ninth duct will be initiated in February restrained by the required recycling of the Shrouds into the fixtures for completion.

Elevon duct support plates have been thoroughly rechecked for hardness and contours. The balance of 13 uninstalled units are undergoing a process of reheat treat, and aging. The two plates installed on the right forward duct shroud will be reheat treated and aged in place with special localized treatment.

Strut assemblies for the first aircraft have been completed. Center body ("Flower Pot") assemblies for two ducts have been completed and mated to the propeller gearbox units. The tubing is being mocked up.

Five of a ship set of eight vertical duct struts have been completed and two are in work. Fifteen of the total required eighteen 45° auxiliary struts have been completed and the balance of 3 are in work. All nine required horizontal duct struts have been completed and are in rework to a current change. All leading and trailing edge shroud subassemblies have been completed.

The second fin for aircraft No. 2 has progressed in the fixture through the 40% complete point with the installation of clips, stringers and skins. Both aircraft No. 1 forward elevon assemblies have been completed and the left aft is in work. Both aircraft No. 1 stabilizers have been completed.

The wing assembly for Aircraft No. 2 was skinned in the basic fixture, the jig boring completed and is now in the final wing fixture. The left engine Pylon has been completed. The right Pylon and fire walls are in work. Wing assembly No. 3 for Static Test was started in the basic fixture at the close of December.

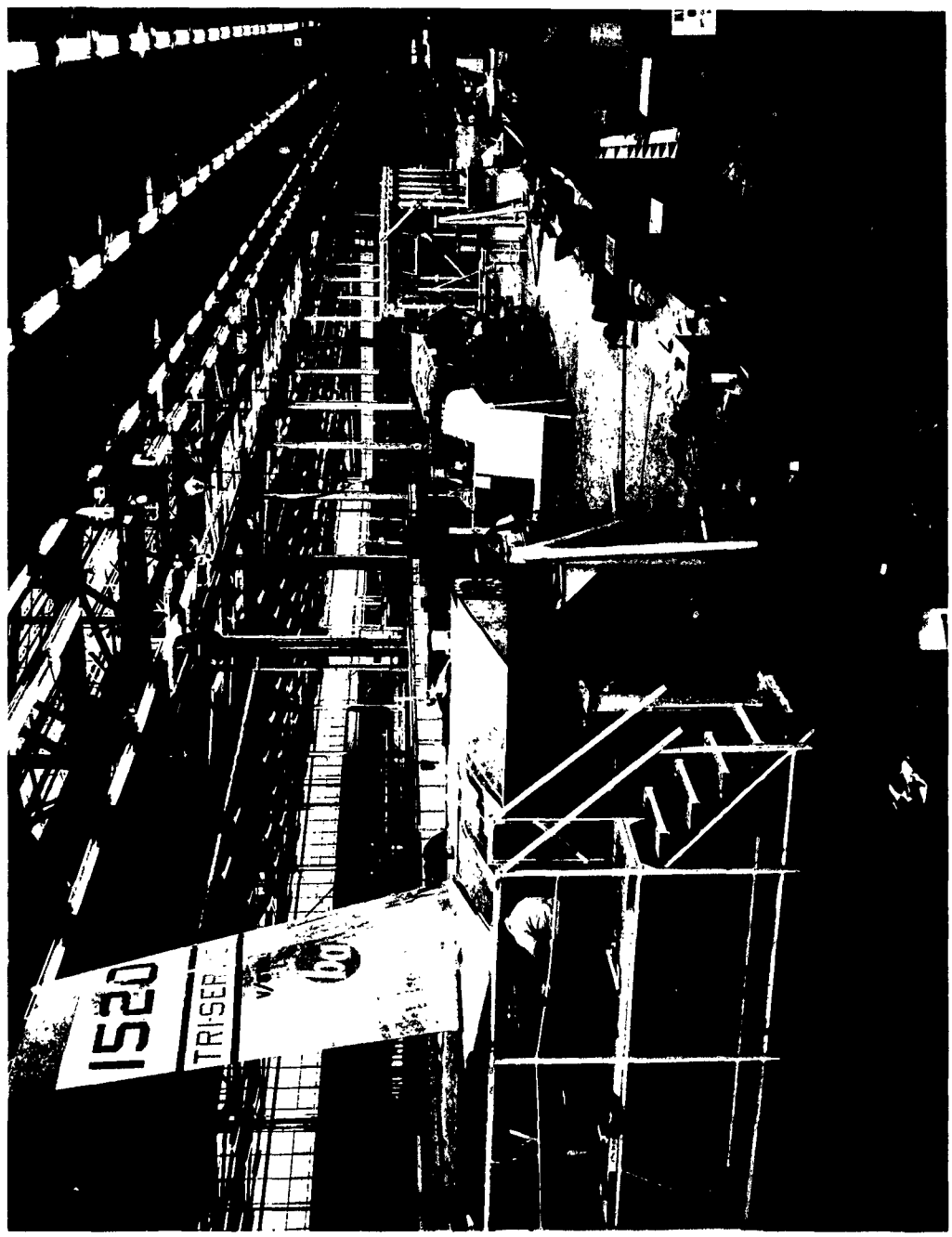


Figure 11. Final Assembly Aircraft No. 1 and 2 - Static Test Fuselage No. 3 in Right Background

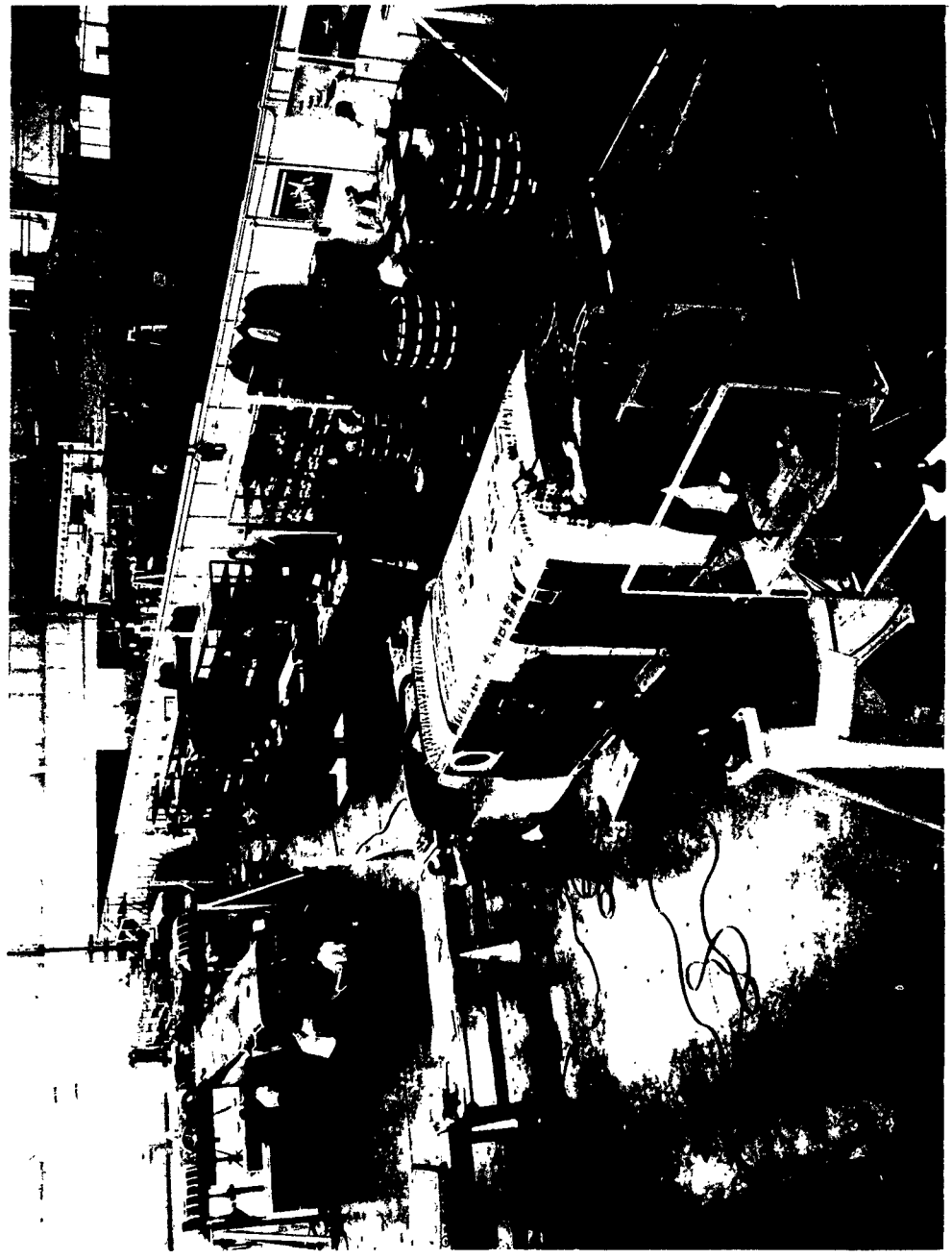


Figure 12. Final Assembly Aircraft No. 1 and 2

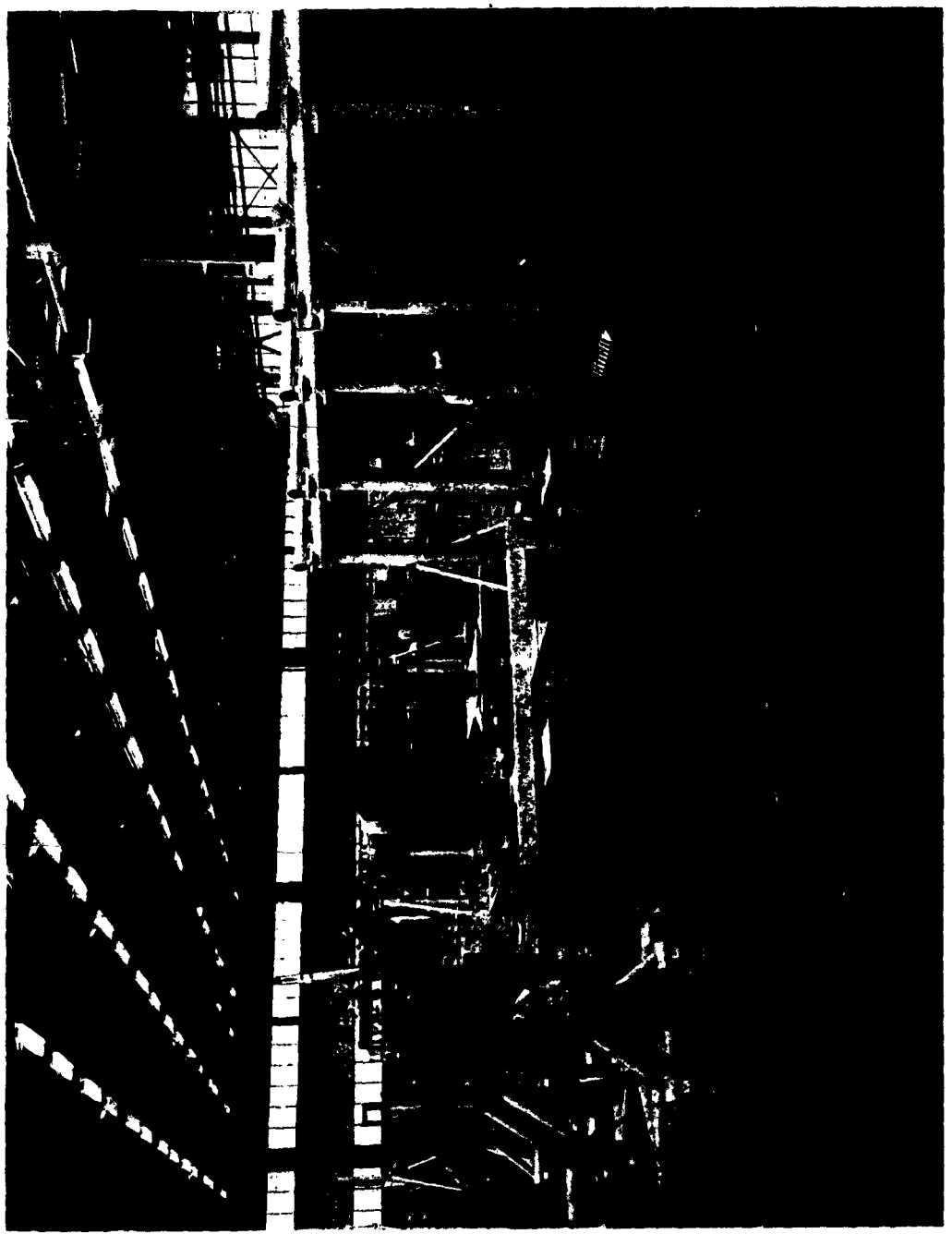


Figure 13. Static Test Fuselage No. 3 - Aircraft Final Assembly in Background

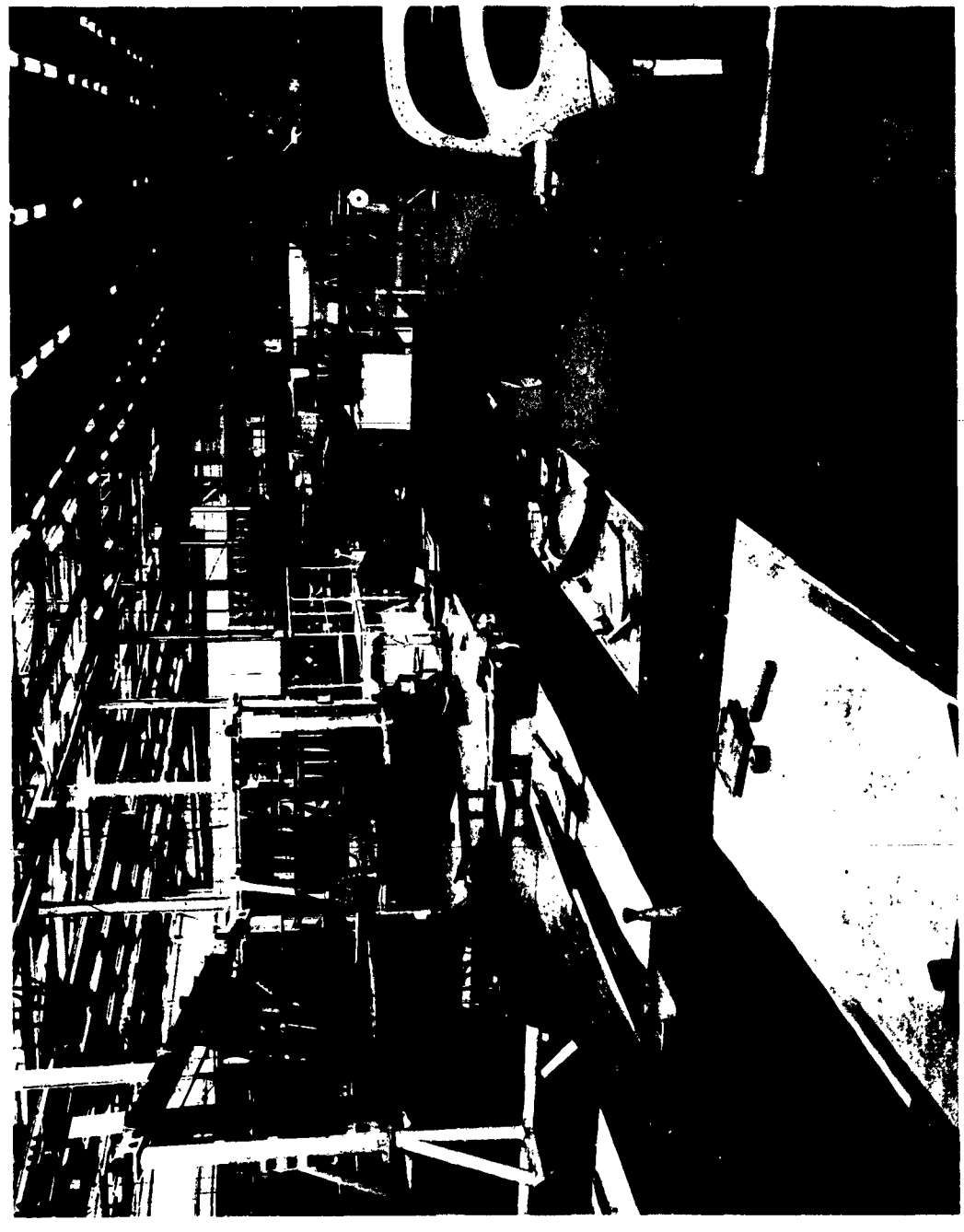


Figure 14. Fin No. 2, Wing No. 3, and Other Assemblies in Fixtures

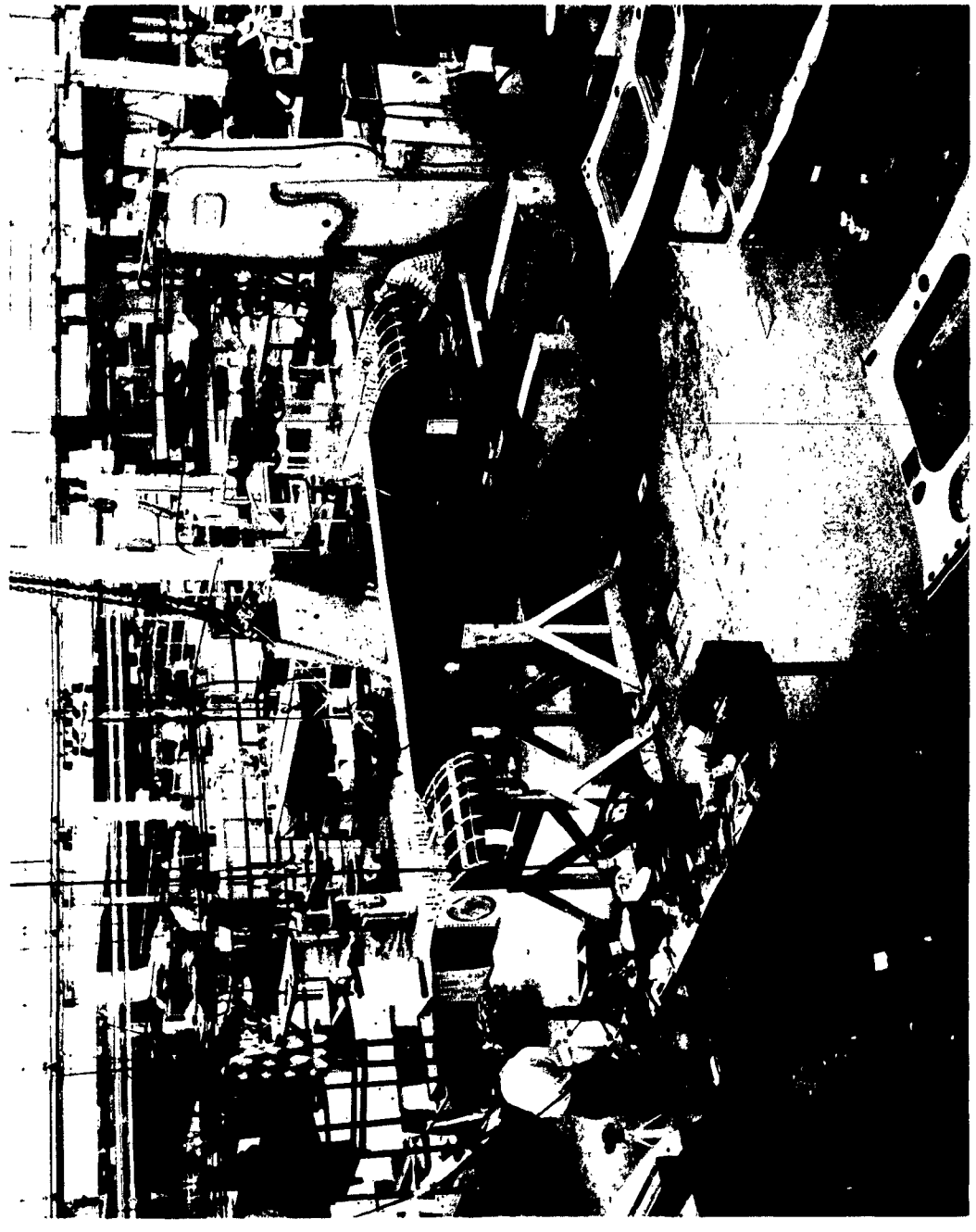


Figure 15. Wing No. 2 in Jig Bore

Figure 16. First Splined -136 Duct Support Tube

Fuselage No. 2 was completed and removed from the basic fixture and installed in the second final assembly fixture. The static test fuselage (No. 3) was started in the basic fixture with bulk head fittings and skin installations progressing. The No. 3 cockpit assembly, to be used for the ejection seat tests, continued in work with a projected completion in early January. The left and right canopy assemblies were completed.

Final assembly of aircraft No. 1 progressed with all systems in work. The fuel tank area is being reworked and the wing and fin have been permanently installed. The optical alignment and drilling of the forward and aft gearboxes is in work. Engine buildup, controls and fuel installations are progressing. Final assembly of aircraft No. 2, after clean up, continued with the fuel tank area rework and systems installation. Shop support of the full scale powered duct model, installing the modifications to the strut fillets, inlet lip contour, completing the tip clearance reductions and installing the blade stress pineapple "V" struts was accomplished during this report period at NASA-Ames Wind Tunnel Facility. The test unit was set up and support followed on a 3 shift operation through the first three weeks of December.

VI. SUBCONTRACTORS

1. Propellers - Hamilton Standard Division

Acceptance tests on propeller No. 8 were held up due to a broken spline, caused by excessive loads imposed through misalignment on the engine test stand. The propeller test rig was rebuilt, and qualification of the No. 8 propeller was rescheduled to start on 5 January.

Vendor personnel were at Bell 29 through 31 December for the purpose of inspecting and making temporary repairs to the propeller blade damaged on the Bell propulsion system test stand. It was ultimately determined that the propeller would have to be returned to the vendor facility for the blade repairs.

Two Hamilton Standard representatives participated in the X-22A Technical Status Review held at Bell and an engineer visited Bell to witness the running of the master control on the propulsion system test stand. As of the end of December, Hamilton Standard estimated they were about ten days away from the starting of the 50-hour PFRT test.

2. Variable Stability System - Cornell Aeronautical Laboratory, Inc.

The program has been proceeding at a normal pace, although there have been some delays in checking out the Variable Stability System equipment due to late deliveries by a subcontractor on printed circuit boards.

A Cornell representative participated in the X-22A Technical Status Review Meeting held at Bell.

3. Transmission System - Steel Products Engineering Company

During the month SPECO shipped longitudinal shafting, locknuts and oil cooler rings to Bell. Due to rejects by Bell there are still two items of shafting open for aircraft No. 1.

SPECO conducted deflection tests on the 441259 seal and determined that the torque loads with misalignment produced an out-of-round condition at the seal retainer mounting diameter. The O.D. of the seal retainer was reduced to increase clearance. SPECO examined the spherical coupling which was subjected to heat and damage on the Bell propulsion test stand.

SPECO is targeted on completion of all contractually required hardware by 10 January. The spare Spirolox rings were received by Bell.

4. Landing Gears - Loud Company

Bell received the No. 2 main landing gear. The No. 3 main landing gear is being held at Loud to gather additional engineering test data.

The No. 3 nose gear was delayed in delivery due to a discrepancy in the jury link. Appropriate VMRR action was taken, and the gear is now ready for shipment.

Most of the required engineering data has been received at Bell.

Plans were made to retrofit the brakes and metering pins at Bell after 4 January. Due to problems related to the retrofit, Goodyear has requested return of the wheel/brake assembly.

5. Duct Support Tubes and Stop Rings - Cleveland Pneumatic Tool Company

Eight stop rings were received by Bell during December.

6. Alternate Vendor for -036 Duct Support Tubes - 20th Century Machine Company

Bell representatives spent considerable time in Detroit during the month monitoring the activity on the duct support tube requirements. The No. 1 -014 tube which was damaged at Equitable Engineering during the last hour of machining was cleaned up and shipped to United Shoe Machinery Corporation for possible limited test use. The No. 2 -014 tube, which was the unit withdrawn from Cleveland Pneumatic, was remachined in the 900 tooth spline area and also shipped in late December to United Shoe for test use.

The No. 3 -014 tube was machined and is now ready for the splining operations.

Because of lack of suitable progress and also a potential strike situation at Equitable Engineering Company, it was necessary to initiate another source for the cutting of the 900 tooth spline. The Invincible Gear Company was selected and did produce a satisfactory sample.

Invincible was successful in cutting a 900 tooth spline on the No. 2 unit -136 duct support tube. Bell Quality inspected the tube on 29 and 30 December and considered it very satisfactory. The unit will be completely finished on all operations and shipped to Bell the first week in January.

Invincible is currently machining the No. 1 unit -136 tube.

7. Harmonic Drive System - United Shoe Machinery Corporation

Bell has shipped two units of the -014 tube to United Shoe for use in testing. The No. 1 unit is considered unsatisfactory, but the No. 2 unit will be used for conducting tests at 100 percent of their value. Bell personnel are planning to be at United Shoe for testing during the first week in January.

8. Ejection Seats - Douglas Aircraft Company

The shipment of the four production ejection seats is being withheld pending completion of the ejection seat tests at Bell, scheduled in January. The two GFE seat actuators are entroute to Bell.

VII. GENERAL

A. TRIPS AND VISITORS

1. Trips

Date	To	Purpose
12/1-23/64	NASA-Ames	Full Scale Powered Duct Tests

2. Visitors

Date	To	Purpose
12/8-9/64	40 Representatives from Three Services and Other Gov't Agencies	X-22A Technical Status and Planning Review

B. OPEN ITEMS (Submitted at least 30 days prior to December 31, 1964 to BuWeps and BuWeps Representative)

BAC Letter No.	Subject	Date Submitted	Required Approval Date
31	Human Factors Data Report (2127-919001)	1/29/63	*
356	Human Factors Data - Interim Report	7/31/63	*
373	Transmission System Test Plan	8/22/63	*
468	General Arrangement Drawing	12/2/63	*

*BAC has scheduled a 30 day interval for approval by BuWeps of each of these submittals after BuWeps Representatives endorsement.

Note: Letters, involving change proposals cp-1 through cp-51, have been removed from this open item list since they are associated with Supplemental Agreement No. 13 and are now being treated by separate contractual action. Letter No. 675, cp-52 has been deleted.

BAC Letter No.	Subject	Date Submitted	Required Approval Date
512	Preliminary Environmental Vibration Report (932002)	1/31/64	*
513	Demonstration Planning and Progress Report	1/22/64	*
577	Demonstration Planning and Progress Report (Revision)	3/25/64	*
636	Inertia Loads Report	5/13/64	*
662	Demonstration Planning and Progress Report (Revision) 931001	6/8/64	*
669	Substantiating Loads Data Report (941009)	6/10/64	*
691	Return of Executed Document C/N5771-64	7/22/64	*
711 (cp-53)	Revision to Transmission Testing	8/19/64	*
712 (cp-54)	Proposed Change Order No. 6 (Ejection Seat Sled Tests) (See Letter No. 717)	8/17/64	*
714	Flight Loads Criteria Report	8/17/64	*
717	Ejection Seat Sled Tests	8/31/64	*
725	Vibration Program Report Revision	9/4/64	*
758	GFE Engine Support, Field Service Rep. at BAC	10/20/64	*
768	Demonstration Planning & Progress Report - Revision	11/4/64	*
772	VSS Specification - Part II, BAC Report 947024	11/5/64	*
775	Structural Test Plan - Wing	11/12/64	*

*BAC has scheduled a 30 day interval for approval by BuWeps of each of these submittals after BuWeps Representatives endorsement.

Note: Letters, involving change proposals cp-1 through cp-51, have been removed from this open item list since they are associated with Supplemental Agreement No. 13 and are now being treated by separate contractual action. Letter No. 675, cp-52 has been deleted.

BAC Letter No.	Subject	Date Submitted	Required Approval Date
778	VSS Specification - Part I & II, BAC Report 947024	11/16/64	*
780	Demonstration Planning & Progress Report (Rev. E, 931001)	11/18/64	*

*BAC has scheduled a 30 day interval for approval by BuWeps of each of these submittals after BuWeps Representatives endorsement.

Note: Letters, involving change proposals cp-1 through cp-51, have been removed from this open item list since they are associated with Supplemental Agreement No. 13 and are now being treated by separate contractual action. Letter No. 675, cp-52 has been deleted.

BELL AEROSYSTEMS COMPANY

BUFFALO 5, N. Y.

835:5:0114-1:AJM/ALS
14 January 1965
Letter No. 811

To: Chief, Bureau of Naval Weapons
Department of the Navy
Main Navy Building
Washington 25, D. C.

Attention: RA-443

Subject: Contract NOw 63-0118-c1
X-22A Research Aircraft
Monthly Progress Report No. 25 (December 1964)

Reference: (a) Navy Contract NOw 63-0118-c1, Section (F)-5

Enclosure: (A) Five (5) copies of Monthly Progress Report No. 25 - December 1964 - BAC No. 2127-933025

Via: BWR (Bethpage Technical Representative)
Bell Aerosystems Company
Post Office Box 1
Buffalo 5, New York

1. Enclosure (A), the 25th X-22A Monthly Progress Report, is submitted in accordance with the requirements of Reference (a) and covers progress through December 31, 1964.

BELL AEROSYSTEMS COMPANY

A. J. Marchese
Project Director

AJM/ALS:mb
Enclosures

cc: See Attached Sheet

BELL AEROSYSTEMS COMPANY

835:5:0114-1:AJM/ALS
14 January 1965
Letter No. 811

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